REMARKS

Claims 1, 3, 4 and 21-36 stand rejected under 35 U.S.C. § 112, second paragraph. It is respectfully submitted that the enclosed amendment obviates the alleged indefiniteness. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 1 and 21 are independent and stand rejected under 35 U.S.C. § 103 as being unpatentable over Jeon or Kaushik. In order to expedite prosecution, claim 21 has been canceled, without prejudice/disclaimer to the subject matter embodied thereby, rendering the rejection thereof moot. This rejection is respectfully traversed for the following reasons.

Claim 1 recites in pertinent part, "a gate insulating film ... including a zirconium oxide film and ... a hafnium oxide film or a hafnium aluminate film and which is formed ***on*** the zirconium oxide film, wherein a silicon nitride film is formed ***under*** the zirconium oxide film" (emphasis added). Neither Jeon nor Kaushik disclose or suggest the ***particular arrangement*** of the respective films. That is, Jeon and Kaushik at best may suggest an insulating film which includes both a zirconium oxide film and a hafnium oxide film in combination, but do not suggest the particular structural arrangement in which the disclosed hafnium oxide film is specifically formed ***on*** the zirconium oxide film.

Indeed, one of the features of the present invention is directed to such an arrangement so that an oxidation species diffused from the high dielectric constant film side to the silicon substrate side can be absorbed by a zirconium metal film so as to form the zirconium oxide film and ***reduce absorption of the oxygen species by the silicon substrate***. Accordingly, it can be made possible for

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the silicon substrate itself to hardly be oxidized, thereby providing the capability to suppress a reduction in the capacitance value (*see, e.g.*, page 5, lines 10-23 of Applicants' specification).

Neither Jeon nor Kaushik consider nor recognize the issues related to oxidation of the silicon substrate in the particular arrangement of a high-K dielectric material. Indeed, both Jeon and Kaushik disclose the combination of a zirconium oxide and hafnium oxide only ***incidentally***, and provide no motivation for arranging them in the particular manner recited in claim 1. In this regard, Jeon and Kaushik suggest zirconium oxide and hafnium oxide ***individually***; and bring up the combination thereof merely as an after-thought with no disclosed preference for the combination, let alone in the particular combinational arrangement recited in claim 1.

Nonetheless, claim 1 has been further amended to incorporate the feature of claim 22. With respect to claim 22, the Examiner relies on Chidambarrao et al. '926 ("Chidambarrao") as allegedly disclosing use of a silicon nitride layer in combination with a zirconium and hafnium oxide. In this regard, Chidambarrao discloses only that "[s]uch high-k material can be a ... silicon nitride, various metal oxides (e.g. aluminum oxide, hafnium oxide, zirconium oxide, and the like) ... and their various combinations" (col. 3, lines 31-45). Again, similarly to Jeon and Kaushik, Chidambarrao does not suggest the desirability ***specifically*** of a silicon nitride layer in combination with a zirconium and hafnium oxide, let alone suggest that the silicon nitride film is formed ***under*** the zirconium oxide film.

In sum, the cited prior art collectively at best discloses using zirconium oxide, hafnium oxide and silicon nitride individually as single layers, and the incidental references to a combination thereof is left with no motivation or preference. Indeed, the references to a combination include materials other than zirconium oxide, hafnium oxide and silicon nitride, thereby emphasizing the lack of motivation for the particular combination of zirconium oxide, hafnium oxide and silicon

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nitride. In any event, none of the cited prior art suggests the combination ***arranged in the particular manner*** recited in claim 1. As described in Applicants' specification, such an arrangement can help reduce oxidation of the silicon substrate and thereby suppress a reduction in the capacitance. Only Applicants have recognized and considered the issues related to oxidation of the silicon substrate in the particular arrangement of a high-K dielectric material, and conceived of a particular structural arrangement of zirconium oxide, hafnium oxide and silicon nitride to enable resolving such issues.

The Examiner is directed to MPEP § 2143.03 under the section entitled "All Claim Limitations Must Be Taught or Suggested", which sets forth the applicable standard for establishing obviousness under § 103:

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (citing *In re Royka*, 180 USPQ 580 (CCPA 1974)).

In the instant case, the pending rejections do not "establish *prima facie* obviousness of [the] claimed invention" as recited in claim 1 because the proposed combinations fail the "all the claim limitations" standard required under § 103.

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all claims dependent thereon are also patentable. In addition, it is respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination.

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Based on the foregoing, it is respectfully submitted that all pending claims are patentable over the cited prior art. Accordingly, it is respectfully requested that the rejections under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Having fully and completely responded to the Office Action, Applicants submit that all of the claims are now in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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